

# AN UNDESCRIBED MONSTRILLOID COPEPOD (COPEPODA: MONSTRILLOIDA) FROM THE NORTHERN YUCATÁN PENINSULA, MEXICO

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## ABSTRACT

A new species of monstilloid copepod belonging to the genus *Cymbasoma* Thompson (= *Thaumaleus*) is described from a female and a male collected in the Laguna de Chelem, a shallow coastal lagoon in the northeastern part of the Yucatán Peninsula, Mexico. The new species, *C. chelemense*, is very closely related to *C. longispinosum* (Bourne) and to *C. morii* Sekiguchi, but can be distinguished from these species mainly by the structure of the fifth legs and genital complex of the female, and by the structure and details of the antennules and genital lappets of the male.

Monstilloid copepods have been reviewed by Davis (1949), who recognized 35 species and three genera, and by Isaac (1975), who included in his key 39 species belonging to six genera. The number of described species has risen to about 90, but Huys and Boxshall (1991) recognized only three valid genera: *Monstrilla*, *Monstillopsis* and *Thaumaleus*. *Thaumaleus* Krøyer, 1849 is a common genus within the Monstilloida, with at least 25 described species (Isaac, 1975; Grygier, 1994a). This genus comprises several species originally described under *Cymbasoma* Thompson, 1888 which has been regarded as a synonym of *Thaumaleus* by followers of Giesbrecht (1892). Davis (1949) and more recently Huys and Boxshall (1991) also ignored *Cymbasoma* as a valid genus. Grygier (1994a) reviewed the nomenclatural status of both genera and concluded that *Thaumaleus* is not a valid genus and all species assigned to this genus (except the type, *T. typicus* Krøyer, 1849) should be included under *Cymbasoma*. In this paper, Grygier's position and the rescue of *Cymbasoma* as a valid genus are adopted. So far only three species of *Cymbasoma* (as *Thaumaleus*) (*T. quadridens* Davis, 1947 from Florida, *T. boxshalli* Suárez-Morales, 1993 and *T. quintanarooensis* Suárez-Morales, 1994 from the eastern coast of the Yucatan Peninsula) and an unconfirmed record of *C. thompsonii* Giesbrecht, 1892 (Suárez-Morales, 1990) have been known to occur in tropical waters of the northwestern Atlantic Ocean.

As part of a survey of coastal areas along the northern coastline of the Yucatan Peninsula, plankton samples were collected in the Laguna de Chelem, a shallow lagoon located on the eastern portion of this coast. Our taxonomic analysis of the samples revealed the presence of an undescribed species of a monstilloid copepod belonging to the genus *Cymbasoma*, which is here described.

## DESCRIPTION

### *Cymbasoma chelemense* new species

*Material examined*: Holotype: adult female, one vial deposited at the National Museum of Natural History, Smithsonian Institution (USNM 264077). Allotype: adult male, one vial deposited at the National Museum of Natural History, Smithsonian Institution (USNM 264078).

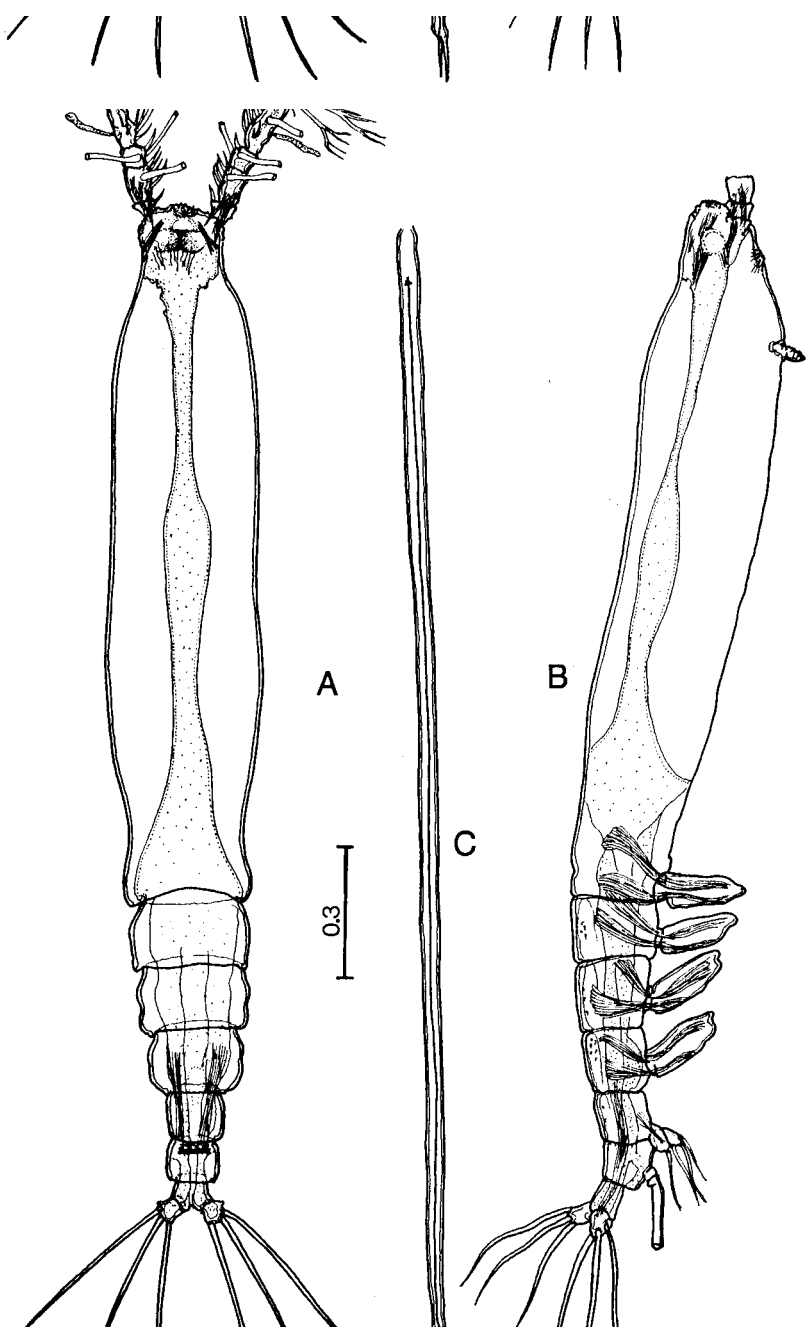


Figure 1. *Cymbasoma chelemense* n.sp. adult female holotype. A) habitus, dorsal; B) habitus, lateral. C) ovigerous spines. Scales in mm.

*Type locality.* — Laguna de Chelem, northern coast of Yucatan Peninsula (21° 19.35' N; 89° 49.10' W). Water column. Depth: 1.2 m.

*Habitat.* — The Laguna de Chelem is a karstic (Quaternary sediments), shallow (mean depth: 0.9-1.2 m), coastal lagoon on the northeastern coast of the Yucatan Peninsula, which is an area influenced by both the Gulf of Mexico and Caribbean waters. The lagoon is partially isolated from marine influence by sandy banks and is adjacent to the fishing village of Chelem, which is also a seasonal, low-density, tourist resort. Both specimens, male and female, were collected at a salinity of 32.9‰, a temperature of 27.5° C, and a pH of 8.2.

*Female.* — Total body length of holotype 2.3 mm. Cephalothorax 1.6 mm long, almost 68% of total body length (Fig. 1A). Oral papilla located less than 20% of way back along ventral surface of cephalothorax (Fig. 1B). Ocelli present, pigment cups medially conjoined, well developed, intensely pigmented only in central portion, round in dorsal view. Cephalic segment with cuticular protuberances on forehead, forming intricate ridges and grooves; two large sensilla on lateral portions of same area (Fig. 2A). Longitudinal cuticular ridges overlying pigmented region of the ocelli. Other cuticular processes, including one pair of scars, on frontal region between oral papilla and antennular base (Fig. 2B).

Antennule length 0.38 mm, less than 15% of total body length, and 21% as long as cephalothorax. Four-segmented, armed with 0-I; 1-V; 2-I; 8-VIII setae and spines. Distal antennular segment with three subequal branched setae aligned near outer distal end. Same segment with five aesthetascs, a large one (0.14 mm) near proximal end, and four smaller ones, one terminal (0.04 mm) and three subterminal (0.02-0.027 mm). Length ratio of antennular segments: 10.3: 25.4: 13.3: 51= 100 (Figs. 2C,2D). First pedigerous thoracic somite incorporated into cephalothorax. This and succeeding three pedigers each bearing well developed swimming legs, all with triarticulate endopodites and exopodites and with the same armament pattern, except for leg 1 (Figs. 3C,3D).

Armament formula of swimming legs as:

|       | Basis | Exopodite     | Endopodite    |
|-------|-------|---------------|---------------|
| Leg 1 | 0-1   | I-1;0-1;I,2,2 | 0-1;0-1;1,2,2 |
| Leg 2 | 0-1   | I-1;0-1;I,2,3 | 0-1;0-1;1,2,2 |
| Leg 3 | 0-1   | I-1;0-1;I,2,3 | 0-1;0-1;1,2,2 |
| Leg 4 | 0-1   | I-1;0-1;I,2,3 | 0-1;0-1;1,2,2 |

Fifth leg unsegmented, consisting of two lobes (Fig. 3B). The inner -endopodal- lobe located at midlength of inner margin, relatively large and rounded, unarmed. Main -exopodal- lobe of fifth legs with three setae, the two borne on outer and distal margins subequal in length and breadth, the third, on inner margin, 20% narrower and about 65% as long as the other two setae. All three setae biserially plumose. Small, rounded, unarmed protuberance present on distal outer margin of outer lobe, near insertion of outermost seta.

Urosome consisting of three segments: fifth pedigerous somite, genital double segment and one free somite. Ratio of length of genital double segment and free last somite: 66.2:33.8 = 100. Posterior margin of genital double somite noticeably wider (40%) than anterior margin of succeeding free somite (Fig. 3A). Anterior half of dorsal surface of genital double somite with a number of transversely aligned cuticular ridges. Genital complex somewhat elongated, with ovigerous spines (3.2 mm) unbroken, joined at the

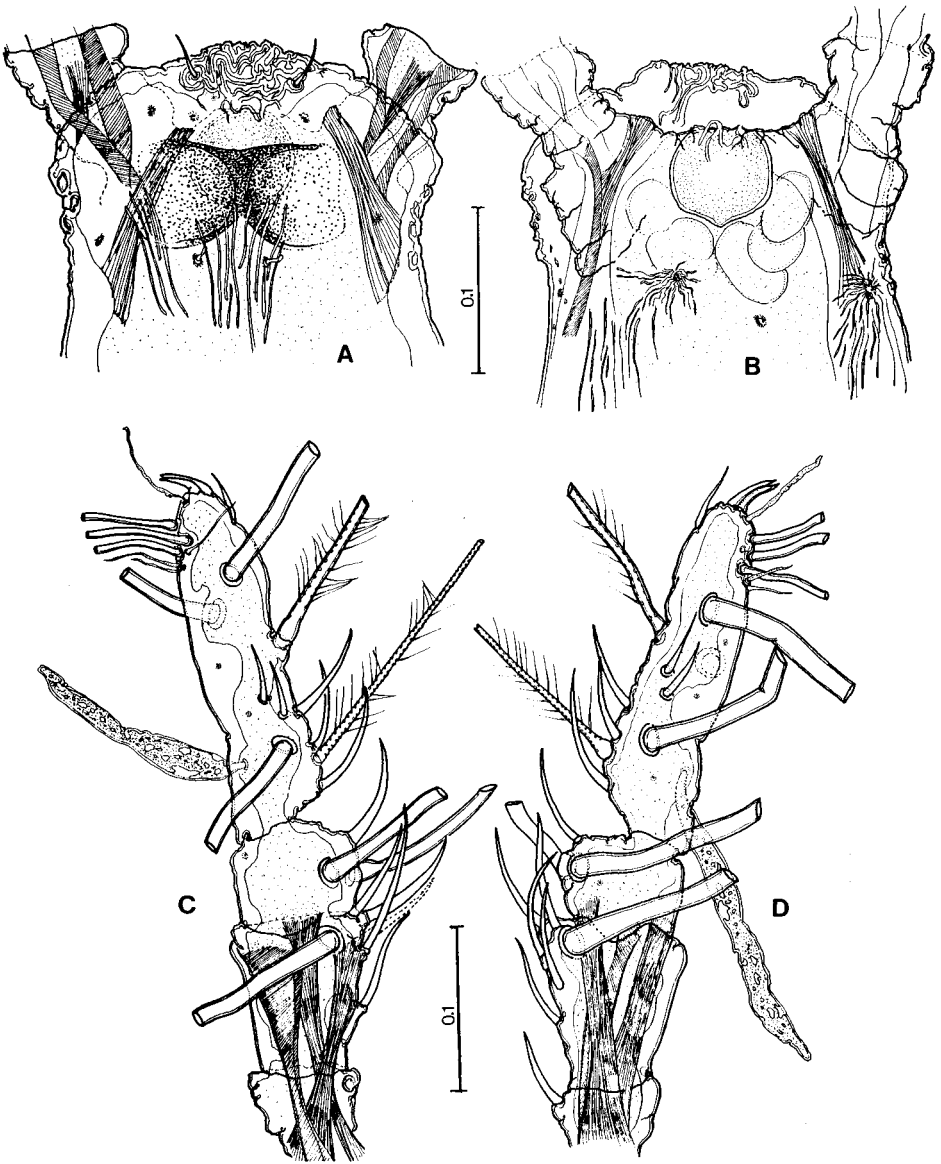


Figure 2. *Cymbasoma chelemense* n.sp. adult female holotype. A) forehead, dorsal; B) forehead, ventral C) left antennule, dorsal; D) right antennule, dorsal. Scales in mm.

base, almost 14 % longer than total body length, and approximately ten times longer than urosome (Fig. 1C). Tips of both spines show slight expansion.

Furcal rami nearly quadrate, approximately 1.2 times longer than wide, bearing three well developed terminal setae with almost the same length and breadth.

*Male*. — Noticeably smaller than female. Total body length 1.08 mm. Body relatively robust. Cephalothorax almost 50% of total body length (Figs. 4A,4B). Oral papilla not prominent, located less than 20% of way back along ventral surface of cephalothorax. Ocelli present, pigment cups conjoined medially, rounded in dorsal aspect as in female,

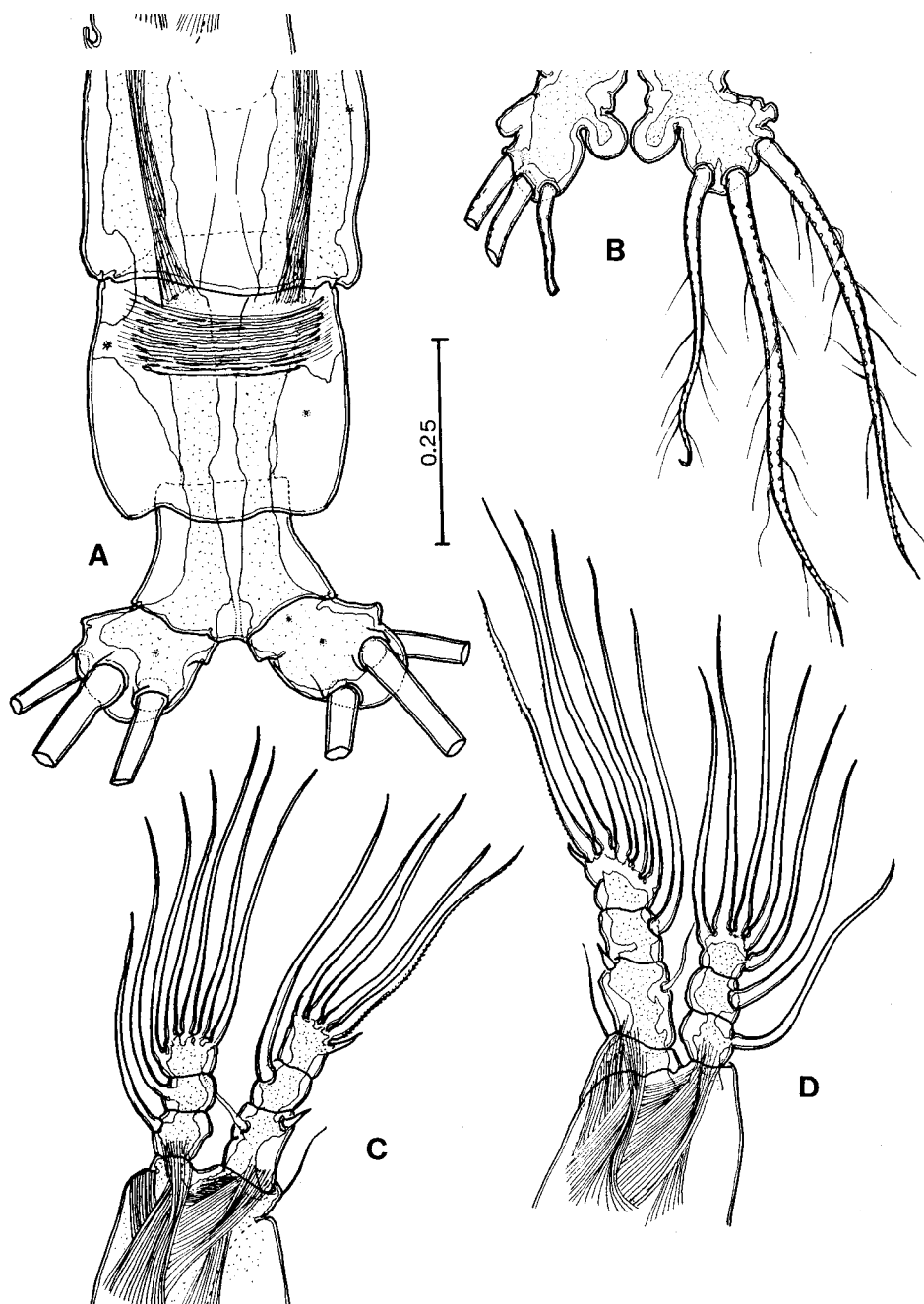


Figure 3. *Cymbasoma chelemense* n.sp. adult female holotype. A) urosome, dorsal; B) fifth legs, anterior view C) first leg; D) second legs. Scale in mm.

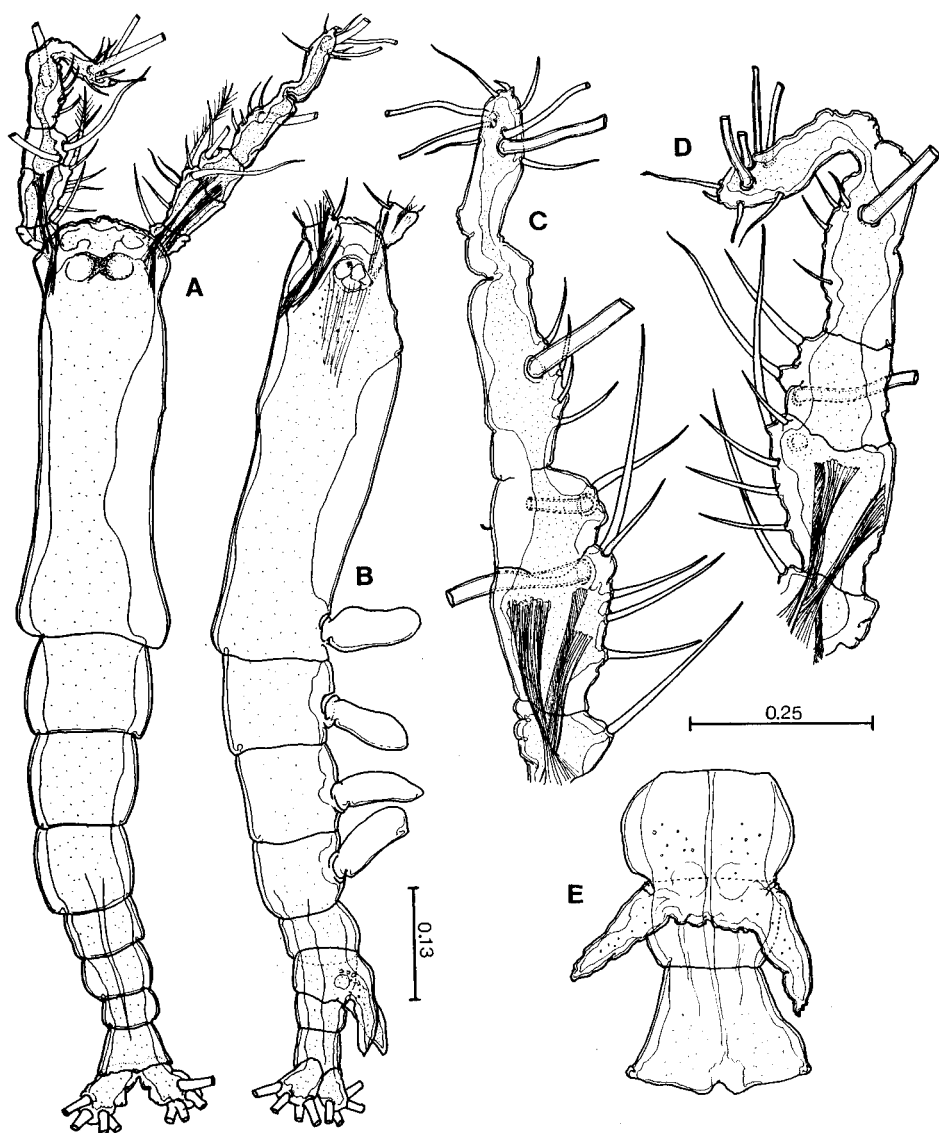


Figure 4. *Cymbasoma chelemense* n. sp. adult male allotype. A) habitus, dorsal. B) habitus, lateral; C) right antennule, ventral; D) left antennule, ventral; E) genital lappets, anterior. Scales in mm.

but poorly pigmented. Cephalic segment smooth except for cuticular corrugations on forehead surface, lighter than in female.

Antennule length 0.32 mm, more than 30% of total body length (Figs. 4A,B), five-segmented, armed with 0-I; 1-V; 1-II; 1-IV; 5-IV setae and spines; terminal segment geniculate (Figs. 4C,D). Length ratio of antennular segments: 10: 19.4: 16.2: 26.3: 28.1= 100. Setae on terminal segment unbranched.

First pedigerous thoracic somite incorporated into cephalothorax. First four pairs of swimming legs as in female.

Fifth leg absent. Distal ends of two elongated, diverging, distally flattened genital lap-pets reaching slightly beyond half the length of third abdominal somite (Fig. 4E).

Furcal rami approximately 1.25 times longer than wide, bearing four well developed setae subequal in length and breadth.

*Etymology.* — The name of the new species makes reference to the type locality, the Laguna de Chelem, adding the Latin suffix *ense* to denote its precedence.

## DISCUSSION

The species here described was placed in the genus *Cymbasoma* (= *Thaumaleus*) by the presence of only two abdominal somites in the female and three somites in the male (Isaac, 1975; Grygier, 1994a). According to the most comprehensive key to the species of this genus (Isaac, 1975), the new species matches female and male *C. longispinosum* (Bourne, 1890), which seems to be very closely related to *C. chelemense*. The female specimen of the new species also looks like *C. morii* Sekiguchi, 1982 (Grygier, 1994b) mainly in the proportions of the cephalothorax, the position of the oral papilla, the antennule/cephalothorax length ratio, the dorsal wrinkles on the genital double segment, the swollen tips of the ovigerous spines, and ovigerous spines conjoined at the base. However, the female and male specimens of the new species differ from these in several key structures generally regarded as important in monstrellid taxonomy, such as the morphology of the fifth legs, the antennular armature, the structure of the genital complex (McAlice, 1985) and the body proportions.

In the female specimen of the new species the cephalothorax is 68% of the total body length, while in *C. longispinosum* the value is less than 65 %; in *C. morii* the reported range (Grygier, 1994b) is 66-73%. In the new species the oral papilla is relatively much smaller and shows a different aspect with respect to *C. morii*, but is similar to that of *C. longispinosum*. The strong cuticular protuberances on the forehead of the new species are absent in *C. morii* and in *C. longispinosum*. *Cymbasoma chelemense* lacks three anteroventral knobs described for *C. morii*. The fifth leg's endopodal lobe in *Cymbasoma longispinosum* has a triangular-elongated shape (Giesbrecht, 1892), while the same structure is completely rounded in the new species, as is also in *C. morii* (Grygier, 1994b), where it is relatively smaller than in *C. chelemense*. In the new species the fifth leg's outer ramus has a conspicuous, rounded protuberance on its outer margin, which is absent in *C. longispinosum* and in *C. morii*. The inner seta on female leg 5 is 65% as long as the other two setae, and is slightly thinner, not up to 40% and much thinner as reported by Grygier (1994b) for *C. morii*.

The armature of the antennules is similar in *C. chelemense* and in *C. longispinosum*, but in the latter species the terminal spines of the distal segment are relatively larger (see Giesbrecht, 1892). The new species and *C. morii* also show the same antennular armament pattern, with only slight differences in the number and position of some of the smallest setae, and in the size of the largest aesthetasc of the distal segment. In *C. chelemense* the antennular segmentation is better defined than in *C. morii*.

In the female of *C. chelemense*, the genital double somite's posterior margin is straight and 40% wider than the anterior margin of the succeeding free somite. From Giesbrecht's (1892) excellent illustrations, in *C. longispinosum* this value is less than half (16%) the proportion measured for the new species; in *C. morii* the value is around 30%, and the posterior margin of the genital double somite is somewhat convex. The proportional

length of the ovigerous spine clearly differs among the three species: in *C. longispinosum*, the spines are 42% longer than the body, in *C. morii* they are much longer, about two times as long as body, and in the new species the spines are only 14% longer than the body. All three have a long common base for the ovigerous spines. The reported length of female *C. chelemense* is within the range reported for *C. longispinosum* (2.3 to 3.16 mm) (Isaac, 1975), but is slightly larger than *C. morii* (2.18 mm) (Grygier, 1994b).

Several species of Monstrilloidea have been described from only one sex (McAlice, 1985); Bourne (1890) established *C. longispinosum* (as *Monstrilla longispinosa*) based on one female specimen from Plymouth. The male of *C. longispinosum* was described later by Giesbrecht (1892) (as *Thaumaleus longispinosus*), although it is not clear how the male and female of the species were linked. So far, the only way to link female and male monstrilloids is to raise both sexes from larvae parasitic in the same host (McAlice, 1985). Giesbrecht's decision to assign his male specimen to *C. longispinosum* was clearly not based in this criterion; however, it has been accepted by Davis (1949), Isaac (1975), Martin Thompson (1976) and Huys and Boxshall (1991). The male of *C. longispinosum* resembles closely the male assigned here to the new species. Furthermore, two peculiar morphological characteristics of the female of *C. chelemense* were also found in the male and could be useful to link both sexes: a) the presence of cuticular corrugation on the forehead of the male; b) the general aspect of the ocelli, which are medially conjoined, rounded, and with a stronger pigmentation over the central portion in both cases. So, based on these facts, on the scarcity of material, and considering that in the Laguna de Chelem the male and female specimens of *C. chelemense* were collected in the same locality, we are designating this specimen as the male of *C. chelemense*. The male of the other related species, *C. morii*, is unknown (Grygier, 1994b).

The male of the new species differs from that of *C. longispinosum* in several features. For male monstrilloids the main distinguishing characters are the details of the antennule and the genital appendage (McAlice, 1985). The antennules in *C. longispinosum* have at least three branched setae on the distal segment; in the new species the setae are unbranched (some of these are complete in the specimen, but "cut" for illustration purposes). The armature of the antennules differs between the species, especially on the two distal segments, from a 0-I; 1-V; 2-I; 1-VI; 8-III pattern in *C. longispinosum* to a 0-I; 1-V; 2-I; 1-IV; 4-V in the new species. The antennular distal claw in the new species is relatively shorter, and the distal segment is relatively larger than in *C. longispinosum*. The genital lappets differ in both species. Isaac's (1975) key separated *C. longispinosum* by the "genital lappets short and diverging, not reaching as far as 1/2 way along the 3rd abdominal segment"; most commonly the distal ends of these structures barely exceed the posterior margin of the genital somite. The genital lappets in the new species diverge, but are elongated, not short, and they reach to at least halfway along the third abdominal somite. They are similar to those described for *C. thompsonii* (Giesbrecht, 1892). The size range reported for the male of *C. longispinosum* is 1.8–2.3 mm (Isaac, 1975); with a total length of 1.08 mm, the male of *C. chelemense* is 45% smaller than the minimum size recorded for *C. longispinosum*.

It is furthermore relevant to mention the known geographical ranges of these three species: the Mediterranean, Great Britain, Mindanao, Portugal, Black Sea, Gulf of Suez, Vietnam and the Arabian Gulf for *C. longispinosum*, Japan, supposedly Vietnam and probably India for *C. morii*, and the southern Gulf of Mexico for *C. chelemense*. Presumably, the isolation of the new species with respect to the others would also favour the conception of a different taxon.



The evidence presented in this paper seems to be enough to recognize a new species, *C. chelemense*, which represents the third confirmed record of the genus *Cymbasoma* (= *Thaumaleus*) in Mexican waters, after *C. boxshalli* and *C. quintanarooense* (as *Thaumaleus*) (Suárez-Morales, 1993; Suárez-Morales, 1994).

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